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# Cotton in Central America

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## FOREWORD

In the past 15 years cotton has risen from relative obscurity to become a mainstay of Central America's economy and one of the leading sources of foreign exchange. Recently, the industry has been beset with problems that have prompted many leaders to question cotton's future role in Central America.

This study is one of a series on competitive agricultural developments in foreign countries. It is intended to help U.S. cotton interests evaluate probable Central American competition in foreign markets in the next several years. The study is based in part on a trip by the authors to Central America in late 1969. In addition the authors drew upon numerous published and unpublished reports for information. Previous FAS publications on Central American cotton include: *Cotton Production Expanding in Central America*, FC 4-55, May 1955, by Charles H. Barber; *Cotton Production in Central America*, FAS M-154, November 1963, by Joseph H. Stevenson; and circulars FC-8, May 1967, and FC 5-69, March 1969, by Horace G. Porter.

The authors wish to express appreciation to cotton producers and to business and government leaders in Central America who contributed much to this study. Special recognition is due the agricultural attachés and staffs in San Salvador and Guatemala City and the economic officer in the American Embassy in Managua.

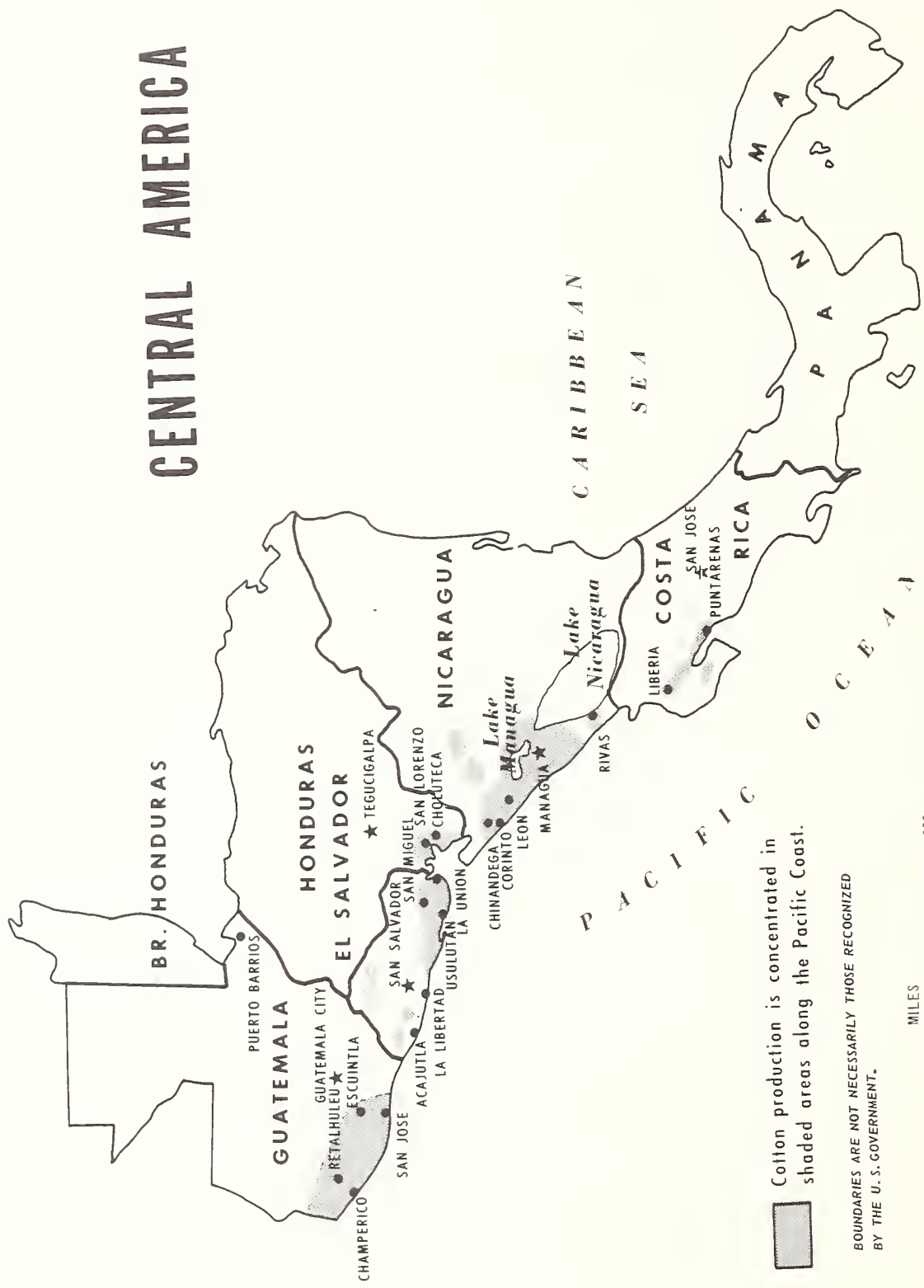
H. R. Webb, Director  
Cotton Division




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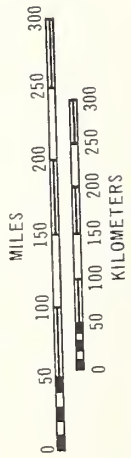
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# CENTRAL AMERICA



 Cotton production is concentrated in shaded areas along the Pacific Coast.

BOUNDARIES ARE NOT NECESSARILY THOSE RECOGNIZED BY THE U. S. GOVERNMENT.





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# COTTON IN CENTRAL AMERICA

By Vernon L. Harness, Cotton Division, FAS  
and  
Robert D. Pugh, President, Cotton Council International

## SUMMARY AND CONCLUSIONS

### Introduction

If prices hold generally within the range of the past 5 years and do not fluctuate violently from year to year, net profits of efficient producers will continue to be adequate to maintain Central American cotton production over the next several years close to the present level of about 750,000 bales (one bale = 480 lb. net weight) or a little less. Thus, although cotton may not continue to be the expansionist force in the Central American economy that it was during much of the past 15 years, it will still be a strong sustaining force, supplying the raw material for a major domestic manufacturing industry and being an important earner of foreign exchange. From the standpoint of U.S. cotton producers, Central America will continue to exert keen competition in foreign markets—especially in Japan, the largest market for both U.S. and central American cotton exports.

### A decade of change

The past decade has seen Central American production jump from less than 400,000 bales to more than 1.3 million bales and then fall to the present level. Attractive prices and high yields in the early 1960's encouraged farmers to clear new land and to shift land from other crops to cotton. As often happens, cotton was planted on considerable acreage that was not well suited for it, but high prices made such operations profitable. Conditions changed in the mid-1960's when international prices turned downward and high yields became more difficult to achieve. Total Central American cotton area fell to only 600,000 acres in 1969-70, compared with the peak of 890,000 acres in 1965-66.

A number of farmers have been weeded out of cotton production by their inability to get new financing or by higher profits in ranching. Most farmers still growing cotton are intent on maintaining high yields and reducing costs. Total costs are around 22 cents per pound for efficient farmers achieving a yield of about 2 bales per acre—Guatemala tends to be lower and Nicaragua higher. Largest increases in operating expenses have been for machinery and labor. Some success has been achieved in lowering insecticide costs. Land prices have declined considerably because of the pessimistic outlook for cotton.

Although production costs of the more efficient Central American producers are similar to those of their U.S. counterparts, Central America has a clear cost advantage in ginning and moving cotton from farm to port. Ginning charges are low—\$12.50 to \$14 per bale against an average of over \$19 in the United States—owing mainly to the large volume handled per gin, low labor costs, and inexpensive bagging and ties. Other savings in marketing costs result from bales being pressed to standard or high density at the gins, lightweight bagging and ties, and nearness to ports. The cotton farmer in Guatemala is not under acreage control, as is the U.S. farmer. On the other hand, subsidies are limited to reduced interest rates in El Salvador and to the refinancing of unpaid debts in Nicaragua, but Guatemalan producers pay an export tax.

Availability of production credit will continue to have an important bearing on whether growers expand or contract a large cash-input enterprise such as cotton or switch to other undertakings. Labor, a major cost item, is exerting an increasing influence on cotton growing in Central America in the form of rising wage rates and some scarcity of skilled and seasonal labor. Cultural practices may have to be adjusted to the labor situation. For some

time to come, many expensive items such as machinery and equipment, insecticides, and some fertilizer will probably have to be imported.

Natural conditions as well as economic factors have contributed to Central America's reduced cotton production in the past few years. Loss of natural fertility on recently cleared land and more severe insect infestations have caused lower yields, especially on land poorly suited for cotton because of soil or rainfall conditions.

The first country to have serious problems was El Salvador, where reduced yields and prices caused cotton acreage to drop from 274,000 acres in 1964-65 to 100,000 acres in 1967-68. Cotton area there has held at about 125,000 acres in each of the past two seasons. Guatemala reached a peak of 285,000 acres in 1965-66 before retrenchment set in; by 1969-70, its cotton area had declined to 190,000 acres. In 1966-67, Nicaragua reached a high of 375,000 acres to fall to 240,000 acres by 1969-70.

## **Farming techniques**

Most cotton production in Central America is on large commercial farms, and many operations are done by machines. The main exception is picking, which is almost entirely by hand except in Nicaragua. Practically all cotton is raingrown in Central America. All cotton is of the American Upland type, and new seed for planting part of the crop is imported each year from the United States. Use of commercial fertilizers is becoming more common, particularly in the older producing areas and on less fertile soils. Combating insects is a major production cost. Insecticide applications, chiefly from airplanes, may total 20 to 30 per season, but producers are attempting to reduce this number, mainly by delaying the first spray and by using insect counts to determine the need for additional sprays. Diseases are a minor problem, except that bollrot often causes the loss of bolls on the lower 18 inches or more of the plant, which usually grows quite tall.

Many Central American leaders recognize that the trend toward greater diversification of agricultural output—both for domestic use and export—may be a beneficial one. Both the population increase of 3 percent or more a year and the generally low-quality diet emphasize the need for larger food-crop production. As more capital and technical know-how become available and as export markets are developed, a greater number of other climatically suited crops—such as tropical fruits and nuts—may be produced commercially, thereby lessening dependence on coffee, bananas, and cotton.

The major cotton-producing countries in Central America are members of the International Cotton Advisory Committee but not of the International Institute for Cotton.

## **GUATEMALA**

### **Production trends**

Agriculture dominates Guatemala's economic activity, employing nearly three-fourths of the working population and earning more than 90 percent of the nation's foreign exchange. Coffee continues as the long-time leader in export earnings, with cotton a distant second. Bananas, meat, and sugar follow.

Despite unsettled political conditions during the 1950's, cotton area rose from 6,000 acres to 68,000 acres, spurred by attractive world prices, control of malaria in the Pacific coastal regions, new roads, low labor costs, and investors (both Guatemalan and foreign) willing to establish large-scale cotton operations.

Following a phenomenal rise during the early 1960's, cotton area and production have trended lower in recent years. Acreage in 1969-70 fell below 200,000 acres, the smallest since 1962-63 and well below the peak 285,000 acres reached in 1965-66. Production has declined somewhat faster than area as yields have fallen. Production in 1969-70 fell to 235,000 bales from 335,000 bales a year earlier and the record 412,000 bales reached in 1965-66.

The decline in cotton production has followed lower prices in foreign import markets, some increase in production costs, and difficulty in maintaining yields. With attractive profits no longer fairly certain, many producers, especially those whose primary interest is outside agriculture, have shifted acreage out of cotton.

### **Growing areas**

Cotton is grown in the Pacific coastal lowlands—the best agricultural area in the country, with deep fertile alluvial soils, favorable climate, and relatively level land which permits use of mechanical equipment. This coastal

Cotton area, yield, and production in Guatemala,  
1950-51 through 1969-70

Year, beginning August 1	Area	Yield	Production
	<i>1,000 acres</i>	<i>Pounds per acre</i>	<i>1,000 bales<sup>1</sup></i>
1950-51 . . . . .	6	320	4
1951-52 . . . . .	20	264	11
1952-53 . . . . .	22	349	16
1953-54 . . . . .	27	480	27
1954-55 . . . . .	39	492	40
1955-56 . . . . .	52	406	44
1956-57 . . . . .	32	690	46
1957-58 . . . . .	43	714	64
1958-59 . . . . .	68	529	75
1959-60 . . . . .	44	742	68
1960-61 . . . . .	64	712	95
1961-62 . . . . .	115	605	145
1962-63 . . . . .	165	727	250
1963-64 . . . . .	215	670	300
1964-65 . . . . .	225	666	312
1965-66 . . . . .	285	694	412
1966-67 . . . . .	210	663	290
1967-68 . . . . .	218	771	350
1968-69 . . . . .	228	705	335
1969-70 <sup>2</sup> . . . . .	190	594	235

<sup>1</sup>Bales of 480 lb. net. <sup>2</sup>Partly estimated.

Source: Official and trade statistics, reports of U.S. agricultural attachés, and other information.

plain is about 200 miles long, extending from Mexico on the northwest to El Salvador on the southeast, and ranges from 20 to 40 miles wide. Some of the region is still uncleared, but since 1950 large tracts have been cleared and are now in bananas, sugarcane, and cotton. The region has distinct wet and dry seasons, each lasting about 6 months. During the wet season from May to late October or early November, rains fall almost daily. Annual average rainfall ranges from about 50 inches in some localities to over 100 inches in others.

Production of cotton is concentrated in the Departments of Escuintla, Retalhuleu, and Suchitepequez, with small acreage in the Departments of Quezaltenango, Santo Rosa, and San Marcos.

Escuintla, most southeastern of the major cotton areas, is relatively level and requires considerable drainage. The soil, highly fertile when first cleared, now needs fertilizer. Holdings are large—up to several thousand acres. Under the one-crop system followed there, cotton is grown on nearly all cultivated land in the area as a whole. Therefore, land sold within the cotton area is almost certain to remain in cotton under the new owner, although land on the fringe of the area may be shifted to another use.

Suchitepequez, to the northwest, is also relatively level and well adapted to cotton. Much of this area was formerly in banana plantations and so has more highly developed drainage and road systems. The area around the town of Tiquisate generally has the highest yields in Guatemala.

In the Department of Retalhuleu, further to the northwest and south of the city of Retalhuleu, soils are much heavier and the land is more rolling. Yields are lower, but so are costs. Cotton plants mature faster, which reduces costs of weed and insect control. Lint grades tend to be higher than in other areas. Cotton is also produced near the Mexico-Guatemala border in this department. There the land is even more rolling, soils are too heavy for optimum cotton production, and yields are relatively low.

### Scale of operations and farm labor

Cotton farming in Guatemala is dominated by large-scale commercial enterprises, although small quantities of cotton are produced on small units. The average cotton producer plants nearly 1,000 acres of cotton, and some producers plant several thousand. Less than 1 percent of the acreage is in the hands of farmers planting less than 100 acres each. A relatively small part of the cotton acreage is rented. Some farming operations combine cotton and cattle.

A number of management systems are used, including active management by owners, managers, and partners. Successful operations seem to be ones closely supervised by the owners, although managers are necessary to oversee transient laborers—mostly Indians from the Central Highlands, who fill the large seasonal labor requirements.

Labor efficiency in general is low. The efficiency of the seasonal laborers declines in the high temperature and humidity of the lowlands. In addition, plants are 6 to 8 feet tall and branches are intertangled, making picking difficult. Although there seems to be good “top management” among the entrepreneurs, the supply of middle management personnel is considered (by many producers) inadequate. For example, operators of mechanical equipment are relatively unskilled and need much supervision. As a result, tractors and other equipment do not get proper care and wear out quickly.

## **Production methods**

Machinery, including heavy equipment for clearing land, is used in much of the production process, and, like many of the fertilizers, insecticides, and other items used, must be imported.

**Planting.**—Although there is some variation, most cotton is planted in rows about 40 inches apart. Plants are thinned by hand to 12- to 18-inch spacings in a row. Planting usually begins in early July, although there is a trend toward late June planting to get ahead of white fly infestations late in the season. Some cultivation by hand is usually done after the plants become too large for mechanized equipment. Such workers are paid by the area cleaned rather than by the time worked.

**Varieties.**—There have been official and private efforts to limit plantings to one variety in Guatemala and to plant a variety most suitable to local conditions. All the cotton is of the American Upland type, and new registered and certified seed for planting a small part of the crop is imported each year from the United States. An attempt is made to keep enough new seed circulating so that farmers do not plant seed older than second generation. About 60 percent of the crop is planted to Stoneville 7A and 40 percent to DPL Smooth Leaf.

**Fertilizer.**—Use of commercial fertilizers is becoming widespread. On land recently cleared, fertilizers usually are not applied—in fact, some farmers feel that, on the best soils, fertilizers may cause excessive plant growth. However, the fine soil gradually loses fertility through leaching under tropical rainfall and is subject to wind and water erosion. Then fertilizer becomes essential to maintain high yields. Much of the fertilizer is relatively expensive because it is imported. Although a few farmers plant a green cover crop in winter and turn it under, use of organic material is still minor. A progressive farmer uses 200-300 pounds of a mixed chemical fertilizer such as 15-15-15 or 15-15-5 at planting and side dresses later with nitrogen. After planting, urea mixed with insecticide may be applied by air. Although seldom applied, trace elements are being considered by some farmers.

**Pest control.**—Cotton plants in Central America are highly vulnerable to insect infestations since the crop is grown during the rainy season. Major insect pests include bollworms, boll weevils, leafworms, cutworms, salt-marsh caterpillars, cotton stainers, aphids, red spiders, and white flies. The rains make frequent application of insecticides necessary, usually on a regular spray schedule by air. Some growers make as many as 30 applications, but 20-25 is more common. The number of applications has been reduced recently in an effort to reduce costs; whereas a few years ago, a first application of insecticide was sometimes made before a plant was 30 days old, the present practice is to wait until the insect population builds up too high to be controlled by natural predators. The plant may be 60 days old at that time. Once started, sprays are usually applied at 5- to 7-day intervals until shortly before harvest. Usual insecticides used are DDT, methyl parathion, and ethyl parathion, often in combination. Low- or ultralow-volume applications are usually used. To date, these insecticides have given good control of major pests except white fly, which builds up late in the growing season when the dry season begins. Earlier planting seems to help. Cotton stalks are plowed under after harvest as required by Guatemala’s National Cotton Council to reduce insect carryover into the next season.

In a normal growing season, when the plants have grown to 8 feet or more, bollrot destroys much of the crop on the lower one-third of the plants. Although little headway has been made in solving this problem, bollrot loss was reduced considerably in 1969-70 by heavy rain and flooding early in the season, which reduced the size of the plants. Other diseases have not been a serious problem.

## Financing

Most producers use considerable production credit, although there is no established procedure for obtaining credit for longer than one growing season. Limited intermediate credit for purchasing equipment is sometimes available through dealers.

At present, production credit is obtained from national and private banks, either by individual growers or through producer cooperatives. Considerable financing is obtained through cotton merchants, and some fertilizer and insecticide are purchased on credit.

Guatemala's Commercial Bank of Agriculture extends production credit to many of Guatemala's larger producers. This bank chooses clients carefully and reports a very good repayment record. Real estate, in addition to crop liens, is used as collateral. The bank will make loans covering most direct production costs after the plant is up.

Credit is extended on a monthly schedule. The formula for making a loan is based on the past record of the producer. For example, a farmer with an average yield of 615 pounds of lint per acre will be loaned \$101 per acre and an additional \$1.16 per acre for each 20.5 pounds of lint above the base as indicated by his past record. Most lenders charge interest at 8 percent per annum, but legal costs and charges for stamps and inspections add another 3 to 5 percent.

## Alternative crops

Generally speaking, a farmer who obtains high yields with reasonable efficiency finds cotton much more profitable than most alternative crops, except maybe for sugarcane—if high sugarcane yields could be counted on and a mill that could handle the extra production is close by. On small acreages, some fruits or vegetables for nearby markets might be as profitable, or more so, than cotton; but a widespread shift from cotton to such products would soon glut the market. One of the strong points in favor of cotton is the experience—and therefore the confidence—of growers that cotton can always be sold and that its market price is more stable, despite great shifts in local availability, than the prices of other products. These factors are important to farmers as well as to banks and other institutions and firms that have business dealings with farmers.

From the standpoint of land availability, there is no close competition among commercial crops. One reason for this is that, thus far, land is relatively plentiful in contrast to the scarcity in El Salvador, for example. Extensive areas of land are still available, although there is considerable expense in clearing and developing them, building roads, improving drainage, and providing other facilities necessary for optimum commercial production.

Another reason for the lack of competition among the chief commercial crops is differing growing requirements—for example, cotton is grown in the lowlands, sugarcane usually at slightly higher elevations, and coffee in the highlands. However, there are some overlapping labor needs between these crops, especially during the harvest season.

Beans, grains, vegetables, and other food crops are plentiful on a countrywide basis, though more plentiful in some areas than in others. Generally, food crops are not yet exerting pressure for land used for commercial crops such as sugarcane and cotton, but this situation could change over the years with the mounting food needs of a population increasing at about 3 percent a year.

Major enterprises most likely to continue to compete with cotton for investment capital and management are cattle, bananas, and sugarcane, although other commercial crops probably could and should receive attention, especially in the interest of diversification. For example, there seems to be some potential for essential oil crops such as lemon grass and citronella, even though an oversupply of these could adversely affect prices. Tropical fruits and melons could add diversity if satisfactory export markets were established. Some large-scale corn operations were tried in 1969-70 but encountered serious problems, including insects and a shortage of equipment, labor, and storage facilities.

Guatemala has many areas ideal for livestock production, which recently has taken over a considerable part of the land withdrawn from cotton. However, future livestock expansion will depend heavily on finding export markets for additional output. Although export shipments have advanced strongly in the past few years, future increases, at least in the short run, are expected to be more difficult to achieve. Also, domestic per capita consumption of livestock products has slowed in recent years.

Banana production in Guatemala declined in the early 1960's largely because of storm and disease damage to plants. One of the two large banana-exporting companies completely withdrew from Guatemala, and cotton moved in to claim some of the former banana land. Recently, banana production in new areas has returned the nation's output to earlier levels.

In the final analysis, cotton's ability to hold acreage depends on the crop's relative profitability and, to a lesser extent, on soils, management, and other factors.

## Costs of production

Cost estimates presented here are based on discussions with knowledgeable cotton spokesmen in Guatemala's cotton industry and on limited cost data that have been published. The data should be considered rough guides, varying substantially among individual farms and in different years because of differing production practices and yields.

Cotton is produced at relatively high cost per acre in Guatemala as in other Central American nations. An important consideration in evaluating this cost is yield. Yields per acre in Guatemala have been extremely high for nonirrigated cotton, averaging nearly 700 pounds per acre in the past five seasons. These high yields tend to offset the high cost of production. But even so, profits are severely squeezed during periods of declining cotton prices, especially if yields are lower than producers expect. If yields drop considerably, as they did in 1969-70 (down to an average of 600 lb. per acre) owing to poor weather, or if prices drop and costs continue to rise, the attractiveness of cotton subsidies, particularly for the "marginal" growers whose costs are above average and/or whose yields per acre are below average.

Estimated costs of producing lint cotton in Guatemala at specified yield levels

Item	Pounds of lint per acre		
	600	800	1,000
	<i>Dollars per acre</i>	<i>Dollars per acre</i>	<i>Dollars per acre</i>
Seed . . . . .	2	2	2
Fertilizer . . . . .	12	15	18
Pest Control . . . . .	50	58	65
Labor and machinery . . . . .	60	68	75
Ginning <sup>1</sup> . . . . .	15	22	29
Direct cost . . . . .	139	165	189
Land cost . . . . .	20	23	25
Overhead . . . . .	25	27	27
Total cost . . . . .	184	215	241
Adjusted total cost <sup>2</sup> . . . . .	152	172	187
Total return <sup>3</sup> . . . . .	150	200	250
Net return . . . . .	-2	28	63
	<i>Cents per pound</i>	<i>Cents per pound</i>	<i>Cents per pound</i>
Adjusted total cost <sup>2</sup> . . . . .	25.3	21.5	18.7
Adjusted direct cost . . . . .	17.8	15.2	13.5
Price received <sup>4</sup> . . . . .	25.0	25.0	25.0

<sup>1</sup>Ginning charges of \$12.50 per bale. <sup>2</sup>Less value of seed, calculated at \$56 per ton ex ginyard. <sup>3</sup>Pounds of lint per acre times price received in cents per pound. <sup>4</sup>Estimated price for lint dockside, excluding transportation charges and export taxes.

Generally, cotton production costs have tended to increase with wage rates and costs of other input items, many of which must be imported. For example, large outlays must be made to import airplanes, tractors, cultivating equipment, planting seed, fertilizers, insecticides, gins, trucks, replacement parts, and so on. The biggest cost items are insect control and picking, which together account for about half of total direct costs, although this proportion as well as the dollar cost varies, depending, for example, on the method used in each operation or on how many times and how much insecticide is applied.

Some progress has been made in reducing pest control costs by delaying the first application, and some farmers feel that further progress can be made by making applications on the basis of insect counts rather than on a fixed

schedule. However, farmers are accepting the insect-count method slowly—only after they are convinced that lower yields are not likely to result.

Cotton is basically a mechanically produced crop, but man-hour requirements per unit are high because all picking and some thinning and chopping are by hand. Wages (including fringe benefits) for picking cotton are about 1½ cents per pound for the first picking and over 2 cents for the second. The low labor productivity offsets minimum daily wages of only about \$1.25.

Ginning charges range from 2.2 cents to 2.9 cents per pound of lint, or about \$11 to \$14.50 per bale. The average charge is about \$12.50. Ginning charges are more than offset by the value of the seed.

Charges for moving lint cotton from a gin into export channels are as follows:

<i>Item</i>	<i>Charge</i>
Fiscal tax . . . . .	1½ percent of invoice price
Export documents . . . . .	\$0.10 per bale
Export tax . . . . .	\$1.00 per bale
Municipal tax . . . . .	\$0.80 per bale
National Cotton Council tax . . . . .	\$0.25 per bale
Truck freight . . . . .	\$0.50-\$1.50 per bale
Port charges . . . . .	\$1.65 per bale
Port inspection . . . . .	\$0.10 per bale

Low cotton prices have forced reductions in land charges in the past year or so. Current rents are between \$20 and \$25 per acre, generally payable in advance. Some of the better cleared cotton land is selling at about \$150 per acre, well below the peak several years ago. Lower rents help offset lower priced cotton grown on rented land, and lower land prices enable new owners to start operations at lower cost.

## Harvesting and ginning

Cotton is harvested by hand in Guatemala from early December through March. A few years ago, the crop was usually picked two to four times a season. As production rose, labor grew more difficult to obtain and wage rates increased, especially for second or third picking. Now, most producers wait until their crop is about two-thirds open before picking is started, so that much of the crop is picked only once. Only the first fields picked require a second picking.

The large, intertangled plants make it difficult to use picking machines, which have been tried from time to time but have not worked well. Money saved by machine pickers was more than offset by lower quality resulting from that method of harvesting, by the financial investment in defoliation and imported machines and parts, and by the lack of qualified service personnel. Should labor become scarce in the future, machine pickers may come into use; if so efforts will have to be made to use production techniques that facilitate use of the machines.

It is possible that machine harvest would reduce the quality of Guatemalan fiber less now than it would have several years ago when fields were hand picked several times a season. Machine harvest would tend to increase trash content, but not to change the color, now that cotton is picked only once or twice and left in the field long enough to pick up a light gray cast anyway. And machine harvesting could reduce some fiber damage by replacing the present practice of tramping seed cotton in trailers when field sacks are emptied. However, machine harvest is not likely as long as low-cost labor is available. In fact, some cotton spokesmen feel that the cotton harvest provides income to too many people to allow widespread machine harvest, even in the event of a change in costs.

In 1969, there were 27 gins in Guatemala, nearly all with three or four gin stands. Most of the gins are modern and equipped with driers and single or double lint cleaners. All are of U.S. manufacture. These high-capacity gins turn out more than 10 bales per hour. Some gins are privately owned, but most are held in partnership arrangements by several producers or by cooperatives.

Ginning capacity is adequate. During the 1968-69 season, over 12,000 bales were handled by the average gin compared with an average of 9,000 bales per gin for the smaller 1969-70 crop. Gin owners feel that 10,000 bales per season are needed to cover all direct costs and pay off total investment over a 5-year period.

Wire or metal straps are used to tie bales. Tare totals 4 to 5 pounds when wires and lightweight cotton bagging (1½ lb.) are used. Use of steel straps and the cotton cover increases tare to 8 pounds. The cotton bagging is made by

the domestic textile industry. Though the cover tears easily, bale hooks are not used and, reportedly, bales reach their destinations in good condition. Gross weights of Guatemalan bales average slightly over 500 pounds.

Gin turnout from seed cotton averages around 35 percent, with some variation because of ginning practices.

Seed cotton usually is brought loose in trailers (some with a 10- to 12-bale capacity) to the gin where it is held in the open until ginned. Guatemalan gins in the 3- to 4-month rush season operate 24 hours a day, 7 days a week. Since harvesting is done in the dry season, damage from open storage is minor, except in the event of a rare rain. Bales and cottonseed are also generally stored in the open before moving to port or processing plants.

## Marketing

Local consumption has accounted for only about 35,000 bales or 10-15 percent of the disappearance of the Guatemalan cotton crop during the past few years; thus, most of the crop moves to overseas markets. Japan has been the principal buyer of Guatemalan cotton recently. Other buyers included Western European countries, principally those in the Common Market.

Marketing methods for the most part are direct. Most of the growers who do not belong to one of the cooperatives have large quantities to offer and usually sell directly to the merchants, some of whom represent U.S. firms.

Members of cooperatives usually market their cotton through these organizations. Major cooperatives are the Asociacion Guatemalteca de Productores de Algodon (AGUAPA) and the Algodonera Guatemalteca, S.A. (AGSA). These organizations provide a wide variety of other services for their members, including: importation of insecticides, planting seed, and fertilizer; facilities for spraying insecticides by airplanes; procurement of credit; conducting research; dissemination of information on research and production practices; and ginning and grading services. Members are not required to use all the services offered by a cooperative.

Cotton supply and distribution in Guatemala,  
1950-51 through 1969-70

Year, beginning August 1	Stocks, August 1	Pro- duction	Total supply <sup>1</sup>	Con- sumption <sup>2</sup>	Exports
	<i>1,000 bales<sup>3</sup></i>	<i>1,000 bales<sup>3</sup></i>	<i>1,000 bales<sup>3</sup></i>	<i>1,000 bales<sup>3</sup></i>	<i>1,000 bales<sup>3</sup></i>
1950-51 . . . . .	4	4	14	11	—
1951-52 . . . . .	3	11	16	11	—
1952-53 . . . . .	5	16	21	12	—
1953-54 . . . . .	9	27	36	12	13
1954-55 . . . . .	11	40	51	12	30
1955-56 . . . . .	9	44	53	12	35
1956-57 . . . . .	6	46	52	12	30
1957-58 . . . . .	10	64	74	15	45
1958-59 . . . . .	14	75	89	14	65
1959-60 . . . . .	10	68	78	13	55
1960-61 . . . . .	10	95	105	16	80
1961-62 . . . . .	9	145	154	25	115
1962-63 . . . . .	14	250	264	30	221
1963-64 . . . . .	13	300	313	30	269
1964-65 . . . . .	14	312	326	30	282
1965-66 . . . . .	14	412	426	30	353
1966-67 . . . . .	43	290	333	30	298
1967-68 . . . . .	5	350	355	35	269
1968-69 . . . . .	51	335	386	35	325
1969-70 <sup>4</sup> . . . . .	26	235	261	35	200

<sup>1</sup>Includes imports in 1950 and 1951. <sup>2</sup>Includes cotton destroyed. <sup>3</sup>Bales of 480 lb. net. <sup>4</sup>Partly estimated.

Source: Official and trade statistics, reports of U.S. agricultural attachés, and other information.

After a producer's cotton is ginned at a cooperative gin, it is sampled and graded and then delivered against prior sales in even running lots. The cooperatives usually sell as much as 3 or 4 months in advance to local merchants who in turn sell their own quality designations to foreign importers f.o.b. steamer. After the cotton is sold by the cooperative, credit obligations of grower-members are met at the bank, and then payments are made to members, with final accounting at the end of the season.



The major part of Guatemala's cotton is sold on the basis of Guatemalan standards. Guatemala has 10 grades of cotton. Cotton commonly falls in the higher grades early in the season. But later in the season, exposure to the elements causes the fiber to lose brightness and to pick up a dull or gray cast, and cotton usually falls in the lower grades. Little variation is noted in trash content, due to hand picking and adequate gin cleaning. About two-thirds of the crop staples 1-1/16 inches long. Most of the remainder is 1-3/32 inches except small quantities at 1-1/32 inches near the end of the season.

Guatemala's cotton exports by country of destination,  
1964 through 1968

Country of destination	Year, beginning August 1				
	1964	1965	1966	1967	1968 <sup>1</sup>
	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>
Belgium . . . . .	13	11	11	4	3
El Salvador . . . . .	0	3	4	5	5
Germany, West . . . . .	24	29	18	18	9
Hong Kong . . . . .	9	8	7	12	6
Italy . . . . .	26	29	46	18	51
Japan . . . . .	169	149	131	166	75
Korea, South . . . . .	1	0	2	6	1
Netherlands . . . . .	8	2	3	1	3
Philippines . . . . .	1	4	6	2	1
Portugal . . . . .	1	30	23	16	5
Spain . . . . .	11	33	8	2	( <sup>3</sup> )
Taiwan . . . . .	7	16	8	5	8
United Kingdom . . . . .	13	11	9	8	4
Other countries . . . . .	18	28	22	6	10
Total . . . . .	301	353	298	269	181

<sup>1</sup> Aug.-Mar. Full season estimate is 325,000 bales. <sup>2</sup> Bales of 480 lb. net. <sup>3</sup> Less than 500 bales.  
Source: Direction General de Estadistica.

Guatemala's National Cotton Council (Consejo Nacional del Algodon) reported the breakdown of the 1968-69 crop by Guatemalan grades and approximate international standards as follows:

<i>International grades</i>	<i>Guatemalan grades</i>	<i>Percent of crop</i>
Good middling . . . . .	G1	( <sup>1</sup> )
Strict middling . . . . .	G2	1
Middling plus . . . . .	G3	9
Middling dull . . . . .	G4	50
Middling light gray . . . . .	G5	35
Strict low middling . . . . .	G6	4
Strict low middling light gray . . . . .	G7	1
Low middling . . . . .	G8	( <sup>1</sup> )
Strict good ordinary . . . . .	G9	( <sup>1</sup> )
Good ordinary . . . . .	G10	( <sup>1</sup> )

<sup>1</sup> Less than 0.5 percent.

Cotton for export is hauled by truck or rail from gins to one of the two shallow-water Pacific coast ports, San Jose or Champerico, where it is stored in the open until it can be loaded from lighters. Although roads and port facilities were increased and improved with the rise in cotton production, they are still inadequate.

### Domestic consumption

Local consumption hovered between 11,000 bales and 15,000 bales per year during the 1950's. In the 1960's, equipment in Guatemala City and Antigua was expanded and modernized under Alliance for Progress auspices. As a result, consumption moved up to an annual level of 35,000 bales.

All mills are relatively small, and most carry out all processing operations including spinning, weaving, and finishing. Some even supply part of their own raw cotton needs. No manmade fibers are produced locally, but some are imported to blend with cotton. A part of the yarn output is sold to Indian villages for handweaving. With few exceptions, mills spin middle- and low-count goods, though Guatemalan cotton is capable of being manufactured into higher count material.

Despite larger volume manufacturing of textiles than formerly, production falls far short of domestic needs, and substantial quantities of textiles, both of cotton and of manmade fibers, are imported. Recent official statistics are unavailable, but textile goods from El Salvador, imported under Central American Common Market arrangement, are becoming increasingly common in retail outlets. Reportedly, retail prices have decreased under the impact of these additional imports. Textile imports are likely to remain sizeable for some time to come because the domestic industry finds it difficult to compete with imported textiles made by the large modern industries of other countries. Further increases in cotton consumption are likely to be relatively slow over the longer run and may just about keep up with population increase. The government thus far has not provided protection or assistance toward developing the textile industry, and it has been difficult to obtain the large amount of capital needed for extensive improvement and growth.

## **Outlook**

Acreage reductions in recent years have been mostly in areas where high yields were achieved only at high cost and in areas held in small uneconomic units. Although some further reduction in such land is likely, much of the land now in cotton is in capable hands. These producers (some from the United States) have invested substantial amounts of money and knowhow in large-scale, well-managed cotton production operations. They are definitely conscious of the many economic and natural risks involved.

Nevertheless, many problems confront producers. Physical facilities such as roads and storage accommodations are far from ideal. General agreement exists among those associated with the cotton industry that availability of labor may affect cotton output. Scarcity of skilled labor, especially in the immediate supervisory to midmanagement levels, is already creating some problems. Also, the supply of unskilled laborers is inadequate, especially at harvesttime, when there is demand for migratory workers in coffee, sugarcane, and cotton, all of which mature at about the same time of year. World cotton prices have trended down recently while production costs on many farms have increased. Production credit is becoming more difficult to obtain as lenders evaluate risks in light of reduced profits.

Nevertheless, Guatemala probably has the greatest natural potential for additional cotton production in Central America, although high production costs make a significant acreage expansion unlikely unless the long-term prospects for world prices brighten.

Probably Guatemalan cotton acreage will decline a little from the 1969-70 figure of 190,000 acres. A reduction is most likely in the coastal plains near the Mexican border, where soils are less well adapted to cotton than in other major areas. However, yields should rise from the unusually low level in 1969-70, especially as more producers see the need for heavier applications of fertilizer. Guatemala's usual yield—around 700 pounds per acre, which is extremely high for a raingrown area—probably will not rise much during the immediate future. A reasonable forecast is that production will hold around 250,000 bales from 175,000 acres over the next few years.

## **EL SALVADOR**

### **Production trends and producing areas**

El Salvador is the smallest, most densely populated, and most industrialized of the Central American countries, yet nine-tenths of its foreign exchange earnings come from farm commodities. Coffee is the chief cash crop by a large margin, and, since 1950, cotton has been the second most important export crop, accounting for one-tenth to one-fifth of the value of all exports in the past few years. In 1967, cotton accounted for 3.8 percent of the nation's gross national product.

Cotton area and production moved strongly upward in the 1950's. In 1963-64, a peak of 280,000 acres was reached. Then lower yields on marginal land, reduced world prices, and increasing difficulty in controlling insects combined to force severe acreage reduction. By 1967-68, only 100,000 acres were in cotton. Better insect control

and some improvement in prices allowed a recovery to 126,000 acres in 1968-69. Annual yields in the period 1967-70 held between 763 pounds per acre and 807 pounds per acre compared with the recent low of 564 pounds per acre in 1965-66. Peak production of 375,000 bales was reached in 1964-65, followed by a decline to 159,000 bales in 1967-68 and a return to over 200,000 bales in 1969-70.

**Cotton area, yield, and production in El Salvador  
1950-51 through 1969-70**

Year beginning August 1	Area	Yield	Production
	<i>1,000 acres</i>	<i>Pounds per acre</i>	<i>1,000 bales<sup>1</sup></i>
1950-51 . . . . .	47	276	27
1951-52 . . . . .	72	280	42
1952-53 . . . . .	71	318	47
1953-54 . . . . .	53	516	57
1954-55 . . . . .	73	592	90
1955-56 . . . . .	113	599	141
1956-57 . . . . .	95	753	149
1957-58 . . . . .	99	800	165
1958-59 . . . . .	132	662	182
1959-60 . . . . .	95	723	143
1960-61 . . . . .	140	631	184
1961-62 . . . . .	191	651	259
1962-63 . . . . .	220	720	330
1963-64 . . . . .	280	583	340
1964-65 . . . . .	274	657	375
1965-66 . . . . .	200	564	235
1966-67 . . . . .	120	704	176
1967-68 . . . . .	100	763	159
1968-69 . . . . .	126	781	205
1969-70 <sup>2</sup> . . . . .	122	807	205

<sup>1</sup>Bales of 480 lb. net. <sup>2</sup>Estimated.

Source: Official and trade statistics, reports of U.S. agricultural attachés, and other information.

The major cotton-producing region is on the coastal plain roughly between the towns of Zacatecoluca and La Unión. The Department of Usulután in this area now accounts for one-third of total cotton acreage and La Paz one-fourth; San Miguel follows with 19 percent of the area; and San Vicente, La Unión, Sonsonate, and La Libertad each have between 4 percent and 7 percent. When acreages were large, cotton was planted at higher elevations in soils less well suited to cotton. But for the most part, these fields have returned to corn, pasture, and other uses.

### The cotton cooperative

Very prominent in cotton production and marketing in El Salvador is the cotton cooperative, Cooperative Algodonera Salvadoreña, Ltd., established in 1940. It is a producer organization to which all cotton growers must belong by law—a nonmember planting cotton is subject to heavy fine. The cooperative, unlike the farmer cooperatives in the United States, is essentially an industrywide organization. It not only provides growers with various production services, including loans, but also owns all gins and controls all ginning, grading, and marketing, both for domestic use and for export. All farmers are required to gin with the cooperative and sell through it but are not compelled to use all the cooperative's other services, which include sale of treated planting seed, fertilizers, and insecticides and use of airplanes and pilots for spraying. The cooperative enforces its own regulations pertaining to cotton growing, including issuing planting licenses which each grower must obtain annually, fumigating planting seed, recommending procedures for controlling insects, and requiring growers to destroy cotton planted on unlicensed areas (the latter is seldom done) and to burn or plow under stalks after harvests. The cooperative strives to meet special needs as they arise, but many producers feel that substantial changes are difficult to implement because of the present structure of the membership—only about 1,600 of the 6,000 members planted cotton in 1969-70; the rest are less directly connected with production. (Each member has one vote.)

Number of cotton producers and land registered  
in El Salvador by size of area, 1969-70

Item	Size of registered cotton area								Total
	Less than 17 acres	18-35 acres	36-52 acres	53-69 acres	70-86 acres	87-173 acres	174-865 acres	866 or more acres	
Producers . . . . . number	894	274	136	53	64	71	112	27	1,631
Proportion of producers . . . . . percent	55	17	8	3	4	4	7	2	100
Land in category <sup>1</sup> . . . . . acres	10,047	8,557	6,623	3,971	6,166	12,737	54,950	41,151	144,202
Proportion of total registered land . . . . . percent	7	6	5	3	4	9	38	28	100

<sup>1</sup>Registered area tends to be 7 percent to 10 percent above harvested area.

Source: Cooperative Algodonero Salvadoreno

### Scale of operations and farm labor

As in Nicaragua and Guatemala, cotton acreage in El Salvador is dominated by large holdings, although many producers operate small farms. In 1969-70 producers registered to plant an average of about 85 acres. However, 72 percent of the producers (each with 35 acres or less) accounted for only 13 percent of the registered area and 9 percent (each with 174 acres or more) accounted for two-thirds. Twenty-seven producers each registered 866 acres or more—over one-fourth of registered cotton acreage in El Salvador.

About two-fifths of the cotton area is owned by the operators. Nearly all of the remainder is rented for cash, usually in advance. Most of the owner-operators are in the groups farming the smallest and largest acreages—over half of the farmers registering less than 17 acres and 45 percent of those registering 866 acres or more. It is common in all sizes of operations to rent land to add to the acreage owned. Few non-Salvadorans are now producing cotton.

On the larger farms harvesting is done mostly by migratory workers, many from the mountainous areas. Coffee, cotton, and sugar harvests overlap to some extent, and, because each requires considerable hand labor, some migrant laborers come in from nearby countries to help with harvest. Most other operations, except thinning and late weeding, are mechanized. Small operations may use oxen for power and cultivate and spray by hand.

### Production methods

**Planting.**—Typically, seed is planted in early June in rows 39 inches apart. Plants are thinned later to a 15- to 20-inch spacing. Rank plant growth is usual and contributes to heavy boll loss on the lower 18 inches or more of the plants.

**Varieties.**—Principal varieties are now Stoneville 7A, Stoneville 213, and Deltapine Smooth Leaf. Small quantities of Acala BR2 and Cobal 65 (a local selection) are also produced. New seed is imported from the United States each year by the cooperative for multiplication and distribution to farmers.

Cotton production research has been carried on recently by the cooperative and the government. The government research department has received considerable assistance from the Institut des Recherches du Coton et des Textiles Exotiques (IRCT), Paris, France. El Salvador's research is directed primarily toward selecting or developing varieties more suitable for local conditions and international markets, improving cultural practices, and reducing pest-control costs. It is hoped that within 2 or 3 years a locally developed variety with more tolerance to white fly will be available for widespread use. In El Salvador and other Central American countries, production techniques thus far are largely adapted from other countries such as the United States.

**Insect control.**—Combating insects is the major production activity during the growing season. Large-scale farmers apply insecticide by air, and small ones use hand spray equipment. In small fields plants in about every seventh row are bent over to enable the farmer to walk through the field with spray equipment. Farmers can hire aerial spraying service, mainly from the Cotton Cooperative or one of three large privately owned firms, which charge according to the size and nature of the field. The usual charge per application is between 8 cents and 12 cents per gallon and the usual amount applied is 7 gallons per acre.

Producers are trying hard to hold down costs by reducing the number of applications, which now averages about 25 per season. In place of a rigid schedule, many farmers now use insect-count methods introduced by Israeli

technicians to determine when insecticide is needed. The first application is delayed as long as possible. Turnrows are kept clean.

Major insect pests include bollworm, boll weevil, white fly, leafworm, spider mite, cotton stainer, and aphid.

Usually, methyl parathion is used early in the spray program, and as insect numbers build up—especially bollworms—ethyl parathion is added. After the rainy season ends, the white fly population tends to build up. Toxaphene plus DDT and methyl parathion are used at this time. Thus far no satisfactory measures for controlling white fly have been developed, and resulting losses are sometimes heavy. No legal prohibitions against DDT have been announced.

**Fertilizer.**—Fertilizer use continues to spread, but the kind of fertilizer used varies widely from farm to farm. Typical applications are 150-250 pounds of an analysis such as 15-15-15 at planting and 100-200 pounds of ammonium sulfate later in the season. Other common analyses used include 16-20-0 and 13-13-13.

## Financing

Most growers use some credit to produce their cotton crop. Bank loans are generally used to pay rent, labor, and administrative expenses, and credit from the cooperative is used for such costs as planting seed, fertilizers, and spraying. Credit has a direct bearing on cotton acreage, especially to marginal producers.

In 1969-70, El Salvador's Central Reserve Bank extended financing to banks and the cooperative at a rate of 3 percent; these organizations, in turn, lent money to farmers at 6 percent per annum. Availability of credit varies year by year, depending on economic, political, and other factors. The low cost of the credit gives Salvadoran producers a competitive edge.

## Alternative crops

Natural conditions generally are well suited to a number of crops. There are exceptions, of course, because some of the soils are not nearly as rich as the alluvial volcanic soils in parts of the coastal area; also, insects and diseases tend to thrive in the subtropical climate. Nevertheless, the pressure of increasing population on limited land area underlines the need to grow larger amounts of the basic food crops.

El Salvador is vitally interested in diversifying exports so that the country does not rely so heavily on coffee and cotton. Participation in the Central American Common Market is expected to continue to benefit exports of nonagricultural commodities such as chemicals and other manufactured products. Seafood, mainly shrimp, is increasing in importance as an export item.

Much of the cotton-acreage increase in past years was on land formerly used for pasture and crops other than cotton, especially corn and other grains. Industry spokesmen indicate that corn was perhaps the crop most closely competitive with cotton for land, although the value of cotton in the past few years has made it much more attractive than corn.

Continuation of improved sugarcane production practices by growers and increasing efficiency in milling and refinery operations hold promise for this growing industry. Production of henequen, chiefly by a few large producers, is encouraged by high import duties on competitive fibers and requirements that coffee be shipped in bags manufactured locally from this fiber. Kenaf is receiving attention as an alternative to henequen and to cotton because it requires less cultivation, resulting in lower production costs. Interest in sesame and safflower seems to be growing, and production of these crops may increase further, particularly if returns from cotton decline further.

Greater production of beef cattle adapted to tropical conditions may be an attractive alternative to cotton production, especially in the more marginal areas where soil and other conditions are not especially favorable to cotton growing and where cotton yields are relatively low. Conditions in the country seem well suited to production of rice, melons, vegetables, pineapple, citrus, tobacco, and a variety of other tropical fruits and nuts.

Care must be taken to avoid supplying alternative crops beyond the capacity of local or export markets.

To a large extent, on land capable of maintaining high cotton yields, cotton has no close competitor able to command large acreages. On the other hand, land not well suited to cotton will probably be shifted to other uses, especially if profits from cotton decline further.

## Costs of Production

As with the other countries in this study, cost figures for El Salvador are approximations obtained from cotton

industry spokesmen in the country. The figures should be considered as general guides, not as data for precise comparisons.

Costs in general have advanced over the past few years, especially as use and prices of machinery and insecticides have increased. The sale price of land is high, ranging between \$300 and \$400 per acre, so that little land changes hands. However, there are variations in the overall pattern of increasing costs. For example, land rents—about \$30 per acre—have declined from the influence of reduced profits in recent years. Labor requirements, on the other hand, are high, despite extensive use of machinery for land preparation and early cultivation. Although lavish use of labor contributes to employment in this labor-surplus country, it also raises production costs. And some farmers say that output per worker has decreased in the past few years. Labor for harvesting costs about \$1.25 per 100 pounds of seed cotton, including an allowance for food.

Maintaining high yields is the key to successful cotton farming in El Salvador. Average yields—above 700 pounds per acre for the past few years—are the highest in Central America and among the highest in the world for nonirrigated cotton. For the most part, land that was recently taken out of cotton had failed to produce yields large enough to offset high production costs and declining prices in world markets. To insure profit at current prices, yields must be above 700 pounds of lint per acre.

The cost of producing most of the crop is probably around 23 cents per pound of lint, according to local industry estimates. Cottonseed, valued at about 3 cents a pound, contributes greatly to total gross receipts. And with high average yields and the price of 26 cents a pound for middling (1-1/16 inches) that prevailed early in calendar year 1970, profits from cotton were attractive relative to profits from alternative crops on better farms. However, a decline in cotton prices and an increase in costs, especially in the high-fixed-cost items, could result in lower future cotton production from the less efficient producers.

## Harvesting and ginning

In contrast to other Central American countries, El Salvador's cotton is picked three or four times a season. As a result, the market price is higher. All picking is by hand because with relatively ample labor and rank plant growth there has been no financial incentive to shift to mechanical harvesting.

The country's 13 gins, which are all owned by the cooperative, are relatively modern and in excellent condition. They are of U.S. manufacture and include such equipment as driers, overhead cleaners, single lint cleaners, and standard density presses. One-half of the gins are high capacity. Typically, a crew consists of eight men in the gin and five in the seed cotton storage bins.

The ginning season begins about mid-November and runs 4 months or more. At the height of the season, the gins operate around the clock.

Although much cotton is ginned upon arrival, there are several seed cotton storage sheds at each gin that can accommodate the equivalent of several thousand bales of seed cotton. Farmers from some distance are assigned sections of the sheds where their cotton can be stored until the gin can process it.

Ginyard arrangements have been carefully planned. There are usually three or four gin batteries on each gin complex. The seed cotton storage buildings or open bins are frequently in a circle around the gin building, with trash incinerator and piles of cottonseed in another part of the ginyard. Bale storage is further away, and sheds for storing insecticides, airplanes, and other equipment are on the far edge of the gin plant area.

Bale tare, weighing about 9 pounds, consists of cotton bagging weighing 2 pounds and eight ties with buckles weighing 7 pounds. The legal minimum and maximum gross bale weights are 475 pounds and 525 pounds, and most bale weights range from about 480 pounds to 520 pounds, averaging about 500 pounds. A thin polyethylene plastic strip is placed inside the bagging on one side of the bale in the pressing process to protect the lint from the ink used in stencil-marking the bales. Samples are cut from both sides of the bale.

An average gin battery in El Salvador now handles about 12,000-14,000 bales of cotton per season. With such a volume, it costs about \$12.50 per bale to gin and market a crop. Included in this cost are \$2.50 per bale for transporting the bales from gin to port and \$2.50 for other marketing items.

## Marketing

The cooperative grades and markets the entire crop of cotton and cottonseed, both for domestic use and for export.

Estimated cost of producing lint cotton in  
El Salvador at specified yield levels

Item	Pounds of lint		
	600	800	1,000
	<i>Dollars per acre</i>	<i>Dollars per acre</i>	<i>Dollars per acre</i>
Seed . . . . .	2	2	2
Fertilizer . . . . .	12	17	20
Pest control . . . . .	55	63	70
Labor and machine . . . . .	65	73	80
Ginning <sup>1</sup> . . . . .	15	20	25
Direct cost . . . . .	149	175	197
Land . . . . .	30	30	35
Overhead . . . . .	20	24	25
Total cost . . . . .	199	229	257
Adjusted total cost <sup>2</sup> . . . . .	162	180	197
Total return <sup>3</sup> . . . . .	156	208	260
Net return . . . . .	-6	28	63
	<i>Cents per pound</i>	<i>Cents per pound</i>	<i>Cents per pound</i>
Adjusted total cost . . . . .	27.0	22.5	19.7
Adjusted direct cost . . . . .	18.7	15.8	13.7
Price received <sup>4</sup> . . . . .	26.0	26.0	26.0

<sup>1</sup>Ginning charges of \$12.50 per 500 lb. of lint, including transportation to dockside. <sup>2</sup>Less value of seed, calculated at \$60 per ton ex ginyard. <sup>3</sup>Pounds of lint per acre times price received in cents per pound. <sup>4</sup>Estimated price for lint dockside, excluding transportation charges and export taxes.

Grading, which is done when the cotton is delivered to a gin, determines the grower's price. He receives 90 percent of the estimated value of the lint, taking credit advances into account. A 6-percent interest charge is levied on an advance. Final settlement between the cooperative and the farmer is made after the end of the season when lint and seed from the crop have been sold and returns to each grower calculated.

Salvadoran grades and approximate interational standards are as follows:

<i>International grades</i>	<i>El Salvadoran grades</i>
Good middling . . . . .	A Supra
Strict middling . . . . .	B Magna
Middling . . . . .	C1 Ana
Middling dull . . . . .	C2 Salva
Middling light spotted . . . . .	D1 Vera
Middling (off-color light gray) . . . . .	D2 Slbd
Strict low middling (off-color gray) . . . . .	D3 Mart
Low middling spotted . . . . .	E Lena
Good ordinary to strict good ordinary . . . . .	F Flor
Below grade . . . . .	G

About four-fifths of the crop generally falls in the middling grades or better. Virtually all of the fiber is 1-1/16 to 1-3/32 inches long.

About May each year, local textile mills must let the cooperative know how much cotton they will need for the next calendar year, and they must confirm this figure the following October. The cooperative stores the cotton for mills for a fee, but mills must take all cotton remaining in storage on December 1 so that storage space can be made available for the new crop.

Most of the crop is exported. Sales are on the basis of the cooperative's grades, subject to arbitration. Nearly all of El Salvador's cotton exports are destined for Japan, although small shipments to Western Europe are sometimes made. Cotton exported to Japan is usually sold f.o.b. steamer, and that to Europe is c.f. or c.i.f. basis. Gin-run bales, standard density, are not repressed to higher density before export.

Cotton supply and distribution in El Salvador  
1950-51 through 1969-70

Year, beginning August 1	Stocks, August 1	Pro- duction	Total supply <sup>1</sup>	Con- sumption	Destroyed	Exports
	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>
1950-51 . . . . .	7	27	34	11	—	22
1951-52 . . . . .	1	42	43	11	—	10
1952-53 . . . . .	22	47	69	11	—	46
1953-54 . . . . .	12	57	69	13	1	42
1954-55 . . . . .	13	90	103	13	—	35
1955-56 . . . . .	55	141	198	13	10	140
1956-57 . . . . .	35	149	191	13	12	96
1957-58 . . . . .	70	165	245	13	—	127
1958-59 . . . . .	105	182	287	15	—	247
1959-60 . . . . .	25	143	168	24	6	112
1960-61 . . . . .	26	184	210	25	2	138
1961-62 . . . . .	45	259	304	28	3	208
1962-63 . . . . .	65	330	395	30	18	292
1963-64 . . . . .	55	340	395	35	6	304
1964-65 . . . . .	50	375	425	42	30	255
1965-66 . . . . .	98	235	333	50	—	248
1966-67 . . . . .	35	176	212	53	1	123
1967-68 . . . . .	35	159	197	54	—	116
1968-69 . . . . .	27	205	241	50	—	107
1969-70 <sup>3</sup> . . . . .	84	205	289	50	—	175

<sup>1</sup>Includes imports. <sup>2</sup>Bales of 480 lb. net. <sup>3</sup>Estimated.

Source: Official and trade statistics, reports of U.S. agricultural attachés, and other information.

The marketing section of the cooperative follows the international market situation closely. It may sell as much as one-third of the crop forward, before harvest, after evaluating the quantities and qualities likely to be available locally. As growing and harvesting progress, calculations of expected availabilities are made at regular intervals, and additional forward sales may be made.

Moving the crop is relatively easy. The country is small, movement is largely within the Pacific coast and plateau areas, local mills and ports are accessible by road and rail, and one agency, the cooperative, handles the crop. The Inter-American Highway and the Coastal Highway cross the country from Guatemala to Honduras. Most seed cotton is now transported from farms to gins by truck, although some still moves by oxcart and farm wagon. The country's two railroads provide an important means of transporting cotton from gins and warehouses to the local mills and to ports for export.

El Salvador has three ports and rail connections with Puerto Barrios in Guatemala. At the deepwater port of Cutuco-La-Union, cotton can be loaded on ships directly from railroad cars. Bales are usually unloaded from the cars by fork or hand truck and placed in railroad-owned storage where they may remain for several months at no charge, awaiting ocean shipment. Smaller quantities of cotton are handled at La Libertad, 23 miles south of San Salvador, which is accessible by highway but not by railroad. Warehouse storage is available there, but ships are loaded by lighter. Grains and commodities other than cotton are usually shipped through the port of Acajutla, where a breakwater pier as well as storage and unloading facilities have been added.

### Domestic consumption

Domestic use of cotton has moved unevenly upward over the past several years and now totals about 50,000 bales—nearly one-fourth of El Salvador's yearly crop.

Although the country produces a wide range of cotton textile goods, including material for work and dress clothes, ticking, bags, and the like, a substantial amount of textiles is still imported. Some manmade fiber is imported for blending with cotton.



El Salvador's cotton exports by country of destination,  
average 1960-64, annual 1964-68

Country of destination	Year beginning August 1					
	Average 1960-64	1964	1965	1966	1967	1968
	<i>1,000 bales<sup>1</sup></i>	<i>1,000 bales<sup>1</sup></i>	<i>1,000 bales<sup>1</sup></i>	<i>1,000 bales<sup>1</sup></i>	<i>1,000 bales<sup>1</sup></i>	<i>1,000 bales<sup>1</sup></i>
Belgium and Luxembourg . . .	1	3	1	0	0	0
China, Mainland . . . . .	5	23	0	0	0	0
France . . . . .	2	2	( <sup>2</sup> )	0	0	0
Germany, West . . . . .	14	3	2	0	0	0
Italy . . . . .	6	10	11	0	0	1
Japan . . . . .	205	199	208	112	110	104
Korea . . . . .	( <sup>2</sup> )	1	4	2	( <sup>2</sup> )	0
Netherlands . . . . .	2	4	9	2	( <sup>2</sup> )	1
Philippines . . . . .	2	2	0	2	3	0
Taiwan . . . . .	1	3	3	2	1	0
United Kingdom . . . . .	1	2	2	( <sup>2</sup> )	1	1
United States . . . . .	0	0	0	0	( <sup>2</sup> )	0
Other countries . . . . .	( <sup>2</sup> )	3	8	3	1	0
Total . . . . .	239	255	248	123	116	107

<sup>1</sup>Bales of 480 lb. net. <sup>2</sup>Less than 500 bales.

Source: *Boletín Estadístico*, U.S. agricultural attachés, and other representatives abroad.

Salvadoran mills export some cotton yarn and finished goods to other Central American countries. One industry spokesman indicated that costs were still too high for Salvadoran textile goods to compete effectively outside Central America. However, there is some feeling that domestic cotton consumption can expand further, reducing the imports of cotton textiles and providing for the rising needs of a population increasing at about 3.5 percent a year. Perhaps even more significant is the expectation that the per capita purchasing power of the population will increase. Also, some of the textile firms have been adding new equipment and modernizing their plants with a view to increasing efficiency and volume of production. Two of the mills account for nearly half the domestic cotton consumption.

Pertinent to increased consumption is the measure of protection afforded to the industry under the Central American Common Market (CACM). Some industry leaders feel that if El Salvador and other Central American countries are to experience the economic growth needed to raise their general levels of living, the industries, at least while they are developing, will need protection from, or assistance in competing with, lower priced imports. Textile labor is relatively unskilled, but a concerted effort is being made to train workers in technical operations.

## Outlook

The general feeling in El Salvador is that, at present prices, cotton acreage will hold near current levels for the next few years. Probably there will be a continued trend toward consolidating holdings into fewer and larger units because the small farmer is finding profits more difficult to obtain—partly because of the higher cost of services such as insecticide sprayings.

Yields may rise above the present high level as a result of this consolidation and through improved insect control, use of fertilizer and better adapted varieties, and more efficient management of smaller farms. Some people are hopeful about the possibilities of more double cropping of cotton and a food crop on the same land in the same year. This will depend on whether more irrigation becomes available, which may not happen for a long time. Most of these changes call for a more intensive type of farming that appears more likely to develop in El Salvador than in neighboring countries. However, further increases in yields will require a greater efficiency that may be difficult to achieve under prevailing conditions. Therefore, it is difficult to foresee an exceptional upsurge in cotton yields in El Salvador during the next several years.

In the past, the cooperative has played a significant part in producing and marketing cotton and seems likely to continue to do so because of cotton exports' significance in the national economy. However, the extent to which the government can afford to lend greater support to the cotton industry in the event of further substantial or prolonged price declines is questionable.

Overall, it is probable that production over the next few years will center around 200,000 bales with any variations attributable largely to climatic factors.

## NICARAGUA

### Production trends and producing areas

Production of agricultural commodities provides nearly one-third of Nicaragua's gross national product, employs two-thirds of its labor force, and supplies three-fourths of its exports. Sesame, sugar, rice, corn, beans, and beef are all produced on a major scale. For many years, coffee was the principal "cash" crop that moved into export, but in recent years, with the sharp rise in cotton production, cotton exports have surpassed coffee exports in value. Cotton accounts for close to two-fifths of Nicaragua's total foreign exchange earnings.

Cotton had been grown on only a few thousand acres in Nicaragua for many years, until, in the early 1950's, acreage rose rapidly because of a combination of threatened world shortages, rising prices stemming from the Korean conflict, and increasing world consumption. By 1955-56, cotton acreage totaled 257,000, but heavy rain and insect damage cut that year's crop back to 160,000 bales. Prices in world import markets declined sharply in 1956-57, providing less incentive to plant cotton, and acreage dropped to 182,000.

In 1958-59, in a move to increase production, the government paid cotton growers a direct subsidy of \$8.25 per acre, but this was subsequently discontinued. With adverse weather, mounting costs of combating insects, and lower returns, the government encouraged farmers of relatively low-yielding land to grow crops other than cotton as part of a diversification program. Area declined to 151,000 acres by 1960-61, but in 1961-62 acreage and yields rose sharply. In 1964-65, a record 565,000 bales were produced on 330,000 acres with yields of 822 pounds of lint per acre.

Area continued to increase during the next two seasons, but falling yields held down production. As in the 1956-57 season, yield and cost problems stood in the way of a further increase in area. Yields have remained below 600 pounds per acre in the past 3 years, and area has declined to about 240,000 acres during the same period. The 1969-70 crop was estimated at 295,000 bales, down from 405,000 bales a year earlier and nearly 50 percent below the record.

Cotton area, yield, and production  
in Nicaragua, 1950-51 through 1969-70

Year, beginning August 1	Area	Yield	Production
	<i>1,000 acres</i>	<i>Pounds per acre</i>	<i>1,000 bales<sup>1</sup></i>
1950-51 . . . . .	41	258	22
1951-52 . . . . .	86	262	47
1952-53 . . . . .	64	428	57
1953-54 . . . . .	100	523	109
1954-55 . . . . .	214	460	205
1955-56 . . . . .	257	299	160
1956-57 . . . . .	182	509	193
1957-58 . . . . .	218	482	219
1958-59 . . . . .	223	469	218
1959-60 . . . . .	164	375	128
1960-61 . . . . .	151	464	146
1961-62 . . . . .	185	662	255
1962-63 . . . . .	230	710	340
1963-64 . . . . .	285	691	410
1964-65 . . . . .	330	822	565
1965-66 . . . . .	350	693	505
1966-67 . . . . .	375	672	525
1967-68 . . . . .	360	593	445
1968-69 . . . . .	325	598	405
1969-70 <sup>2</sup> . . . . .	240	590	295

<sup>1</sup> Bales of 480 lb. net. <sup>2</sup> Partly estimated.

Source: Official and trade statistics, reports of U.S. agricultural attachés, and other information.

Climatic conditions in Nicaragua are favorable to cotton in many respects. Temperatures range from 60° to 95° F., averaging around 80°, and rainfall totals about 65 inches a year. In the rainy season that starts in late April

there are short, heavy tropical showers almost daily. Rainfall is lighter in July and August when planting is done, and the light, porous soils can be worked shortly after a rain. During the dry season from December to late April, weather is usually excellent for maturing and harvesting the crop, although dust, high winds, and infrequent but heavy showers sometimes damage the cotton, especially seed cotton piled in great mounds in ginyards.

Cotton production is concentrated in the plains along the Pacific coast, roughly from the city of Rivas on the southwest almost to the Gulf of Fonseca on the northwest and inland to the towns of Somoto on the northeast and Boaco on the southeast. Most other regions of the country are not especially well suited to cotton growing—the central region is mountainous and the eastern seaboard, or Caribbean littoral, is rain forest. The leading producing areas were formerly in the Department of Managua and the departments immediately to the south, but more recently, Chinandega has taken the lead, accounting for about 40 percent of the acreage in 1969-70. Leon is a close second, and Managua is third with over 10 percent of total acreage. Most of the remaining cotton area is in the Departments of Masaya, Granada, and Matagalpa.

In some areas of the Departments of Chinandega and Leon, soils are volcanic in origin, fertile, and very deep but quite fine, porous, and subject to leaching and to wind and water erosion. The same types of soils extend southward to Rivas, but are generally not as deep there. Soils between the towns of Managua and Granada have high clay content. Some of the soils between the towns of Chinandega and Corinto are heavy and stay wet too long in the rainy season to permit satisfactory cultivation of cotton.

### Scale of operations and farm labor

Nicaraguan cotton is grown on both very large and very small holdings. In 1968-69, 600 farmers each planted less than 9 acres to cotton, and 15 each planted 1,730 acres or more. As expected, large operators dominated total output. For example, 5 percent of the farmers grew 45 percent of the crop, whereas two-thirds of the farmers accounted for only 10 percent. The average cotton operation was 100 acres, except in the Department of Managua, where the average was three times that size.

The number of farmers planting cotton has declined sharply in recent years as profits have become less certain. About 2,800 producers registered with the Ministry of Agriculture to grow cotton in 1969-70, compared with 3,237 a year earlier and over 5,000 in 1965-66. Only a few of the growers are non-Nicaraguans.

Number of cotton producers and land registered in Nicaragua by size of area, 1968-69

Category by acres	Producers	Land in category <sup>1</sup>	Proportion of total registered land
	Number	Acres	Percent
Less than 9 . . . . .	600	2,799	0.9
9-16 . . . . .	589	6,158	1.9
17-34 . . . . .	618	12,423	3.8
35-51 . . . . .	308	12,232	3.8
52-68 . . . . .	159	8,147	2.5
69-85 . . . . .	95	6,379	2.0
86-172 . . . . .	337	34,367	10.6
173-345 . . . . .	250	52,470	16.1
346-518 . . . . .	124	46,112	14.2
519-691 . . . . .	57	30,323	9.3
692-864 . . . . .	33	22,931	7.1
865-1,729 . . . . .	52	56,219	17.3
1,730 or more . . . . .	15	34,189	10.5
Total . . . . .	3,237	324,749	100.0

<sup>1</sup> Differs slightly from revised data in other tables.

Source: National Cotton Commission, Managua, Nicaragua.

In 1968-69, about half of Nicaragua's producers rented all of their cotton land, generally for cash in advance. Over two-fifths of the producers owned their cotton land, and 6 percent rented some cotton land to add to their operations. To an increasing extent the landowner also is the manager, although managers are sometimes hired. The renter in some cases is a professional man who lives in the city and hires labor to operate the farm—a practice which was common in the Managua area in past years when chances of returns from cotton growing were especially attractive. Sharecropping is not practiced.

Farm labor is not always plentiful throughout the season, especially in certain localities when harvest is heaviest. Cotton has to compete for harvest labor with such crops as coffee, sugar, sesame, and rice. Labor in general is inefficient, and more trained people are needed. However, at present there seem to be no real labor problems that could seriously limit future expansion of cotton production.

## Production methods

Production practices are relatively modernized, especially on large farms. Tractor-drawn equipment is generally used for land preparation and planting.

**Planting and varieties.**—Seeding is generally in 38- to 42-inch rows, with plants spaced 12 to 18 inches apart in a row.

All cotton grown in Nicaragua is of the American Upland type. In 1969-70, Deltapine Smooth Leaf was planted on 58 percent of the acreage, Stoneville 213 on 31 percent, Stoneville 7A on 8 percent, and Deltapine and other varieties on the remainder. Research is being done to select or develop acceptable new varieties, especially ones with stronger fiber. Some new planting seed is imported from the United States each year, and some seed is saved from the local crop for planting. A few farmers reportedly are growing seed for planting purposes and, after the government certifies it, selling it as certified seed.

**Fertilizer.**—Application of commercial fertilizers has become more widespread in the past several years but is believed to be far from extensive, although statistics on it are not available. Fertilizers are needed in areas where continual planting has diminished the soil's original fertility and in less fertile areas, including some where cotton growing began only in the past few years.

Growers applying fertilizers in the Managua area, where topsoil is thin, use an estimated 300 to 600 pounds per acre of a fertilizer such as 10-30-10 plus urea. Where fertilizer is used in Leon, the average amount applied is about 250 to 350 pounds per acre. In the more fertile Chinandega area, only about 175 to 250 pounds per acre is applied.

**Pest control.**—Because insects attack the crop in great numbers, coping with them is an extensive, high-cost operation. There are no freezing temperatures between seasons to kill hibernating insects, and warm and humid periods while plants are growing and fruiting favor insect development. Also, heavy showers wash off insecticides, making frequent applications necessary.

Major cotton pests include the false pink bollworm, leafworm, and aphids. The white fly is sometimes serious. The only major cotton disease is bollrot.

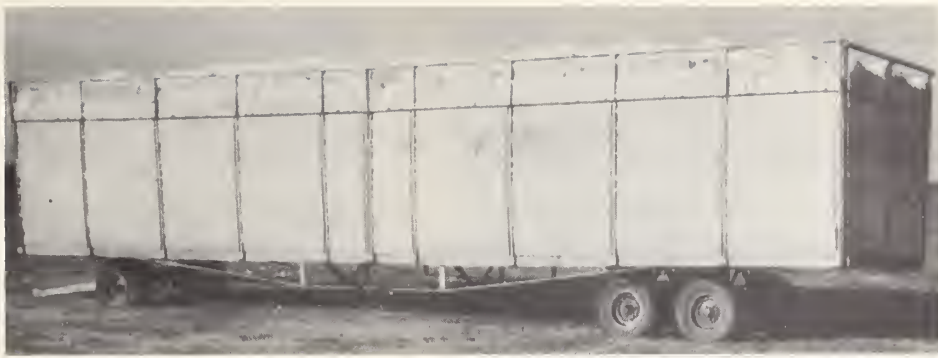
Principal insecticides now used include toxaphene plus DDT, methyl parathion, and ethyl parathion.

Insects are controlled chiefly by airplane spraying, although growers with small acreages sometimes apply spray from a tank carried on a man's back. Sometimes tractor equipment is used for early application and airplanes are used later when plants are tall and foliage is thick. Although some producers own spray planes, custom hiring is more common. In a few cases, several growers have formed producer associations to provide the service.

Insecticide applications average 20-25 per season, but some growers spray as many as 30 times and some less than 20. Although most producers spray on a regular schedule, an increasing number use an insect-count method to hold down costs. Insect control costs have been lowered further by delaying the first application to 60-75 days after the seedlings emerge.

In an effort to control insect hibernation and damage the following year, growers clear away cotton stalks after harvest; then, in compliance with the law, they plow the soil. Many farmers burn the cotton stalks as soon as harvest is completed. The plowing subjects the soil to wind and water erosion, but in recent years this problem has been partly overcome through conservation practices such as contour plowing and some use of cover crops.

**Irrigation.**—Only a few thousand acres of cotton are now irrigated in Nicaragua. In some seasons, irrigation probably would be beneficial to plant growth and development and would increase yields. Irrigation also opens up the possibility of raising two crops of cotton in one season. The country is beginning to move toward irrigation through the Rivas irrigation project sponsored by Nicaragua's National Development Institute (INFONAC), an autonomous government agency. It is expected, however, that most of the irrigated area of about 20,000 acres will be in bananas, rice, and other food crops and that little of it will be in cotton.



Above, seed cotton trailer for hauling picked cotton to gin. Some trailers hold the equivalent of 10 bales to 12 bales of seed cotton. Right, after pressing, bale is weighed and sampled.

Light cotton bagging and wire ties weigh only 4-5 pounds. Below, cotton being loaded onto lighter for movement to ship waiting in deep water.

Lighters transport most cotton shipped from the Pacific coast of Central America.



Below, cotton spray plane on landing strip of a farm. Spray, which comes out of the nozzles on the sides of the plane, is usually applied 20 to 30 times a season.





Above, after the day's picking is weighed, bags of seed cotton are emptied into large trailers for delivery to gin. Right, cotton bales in an El Salvador warehouse await shipment to port.



Left, 3-week-old cotton plants off to a good stand. Cotton plants are thinned by hand around July to between 15 inches and 20 inches apart in a row. Below, weighing the day's picking. Each bag holds 75 pounds to 100 pounds. Pickers average about 100 pounds of cotton per day.



## Financing

Most Nicaraguan growers with a sizeable acreage borrow money to finance cotton production. The National Bank (a government entity) finances an estimated 80 percent of the total crop. The remainder is financed chiefly by insecticide companies, private banks, the growers themselves, and, in some instances, exporters' advance funds late in the season to help growers pay harvesting costs. Growers obtain loans from the National Bank to purchase machinery and to pay for land rent, land preparation, planting seed, and other costs continuing through the harvest. The Bank provides loans, to selected growers, of up to about 90 percent of estimated costs. The amount of a loan is fixed when made, and is usually based on the expense of 25 sprayings. Additional amounts are not advanced later in the season. The Bank's usual interest rate is 9 percent per annum, plus a 1-percent service charge and a 1-percent charge to help cover the cost of technicians who make field inspections and suggest improvements to growers.

To a considerable extent the Bank determines Nicaragua's cotton acreage. Present policy is to continue financing cotton for efficient producers and to encourage others to shift to other crops.

## Alternative Crops

Because the government has actively encouraged cotton producers to shift land to other uses and because of the bleak longrun outlook for cotton prices, considerable land once in cotton is now in unimproved pasture for livestock production. Corn is probably cotton's closest competitor, and some growers find that beans, sorghum, sesame, rice, tobacco, and kenaf are good alternative crops, although the market for some crops, including kenaf, needs to be developed before production can be expanded. Experiments are being conducted on sesame to improve yields. Rice, which is getting some attention as a cash crop, may prove attractive—if drained properly, some wet, heavy soils in the Chinandega area may prove well suited to it. Bananas reportedly are bringing good returns now, and some former cotton lands have been put into this crop. Plantain, a larger, less sweet, and starchier banana used as a vegetable, requires relatively little care and gives much surer returns than cotton.

## Costs of production

Costs of cotton production have tended to rise recently because of the more extensive use of farm machinery and insecticides, most of which must be imported. Wage rates have risen as well but are still low compared with U.S. rates. On the other hand, these rising costs have been offset to some extent by lower land rents—owing to weaker demand and the Bank's policy to lend only half of the rent—and by fewer insecticide applications.

As in all Central American countries, the costs of producing cotton are quite high in Nicaragua compared with other countries where the crop is raingrown. Nicaraguan producers agree that, as a very general rule, total costs and returns are about equal on an average farm when a 637-pound-per-acre lint yield brings 25 cents per pound.

An average cotton farm in Nicaragua lost money in 1969-70. Cotton spokesmen point out that this is the third successive year of relatively poor prices and of yields below 600 pounds per acre. On farms that average only 100 acres, a profit is extremely difficult to achieve. This is an important reason why the number of cotton producers has been declining so rapidly even though Nicaraguan, and all Central American, producers have major advantages over their U.S. counterparts in that ginning is much cheaper and that oilseed prices are usually higher.

When cotton prices are declining, high yields become even more important; yet national average yields now are substantially below the record 822 pounds of lint per acre in 1964-65. Nevertheless, many of the more efficient producers on the better land consistently maintain yields of 1,000 pounds or more per acre. Such producers are making good profits at present prices, though of course less than in earlier years.

Labor is becoming more expensive and, for picking, more difficult to obtain. First picking now costs about \$1.50 per hundred pounds of seed cotton, and second picking may be well over \$2. The tight labor supply encourages use of picking machines. Hand picking costs might be higher were some picking machines not used. Mechanical harvesting is little more expensive than hand picking, though lint grades are lower when it is used.

## Harvesting and ginning

A few years ago, virtually all Nicaraguan cotton was hand picked three or four times a season. Then picking machines were tried unsuccessfully—they were hampered by the tall plants with thick intertangled branches. But as harvest labor became more expensive and sometimes scarce, interest in picking machines was rekindled. Probably 15

Estimated costs of producing lint cotton in Nicaragua  
at specified yield levels

Item	Pounds of lint		
	600	800	1,000
	<i>Dollars per acre</i>	<i>Dollars per acre</i>	<i>Dollars per acre</i>
Seed . . . . .	3	3	3
Fertilizer . . . . .	14	20	25
Pest control . . . . .	46	60	70
Labor and machine . . . . .	75	85	95
Ginning <sup>1</sup> . . . . .	16	21	26
Direct cost . . . . .	154	189	219
Land cost . . . . .	17	20	25
Overhead . . . . .	20	20	25
Total cost . . . . .	191	229	269
Adjusted total cost <sup>2</sup> . . . . .	159	186	215
Total return <sup>3</sup> . . . . .	147	196	245
Net return . . . . .	-12	10	30
	<i>Cents per pound</i>	<i>Cents per pound</i>	<i>Cents per pound</i>
Adjusted total cost <sup>2</sup> . . . . .	26.5	23.2	21.5
Adjusted direct cost . . . . .	20.3	18.2	16.5
Price received <sup>4</sup> . . . . .	24.5	24.5	24.5

<sup>1</sup>Ginning charges of \$13 per bale of 500 lb. <sup>2</sup>Less value of seed, calculated at \$56 per ton ex gin yard. <sup>3</sup>Pounds of lint per acre times price received in cents per pound. <sup>4</sup>Estimated price for lint dockside, excluding transportation charges.

to 20 percent of the crop is now machine harvested. When picked by hand, harvest is delayed so that part of the crop is picked only once. Sometimes the first picking is by hand and the second by machine.

Nicaragua's 34 active gins are equipped with machinery of U.S. manufacture. Most of them have enough drying and lint-cleaning equipment to handle machine-harvested cotton in addition to hand picked. Standard-density presses are the rule.

The average bale weight is approximately 500 pounds net. The tare is 8 pounds on nearly two-thirds of the bales, with a range of 6 to 11 pounds on the rest. Most of the bales now are covered with a lightweight cotton cover and six or seven steel bands. The use of jute bagging is declining. Charge for custom ginning (including bagging and ties) ranges from \$12.50 to \$15.00, averaging about \$13.00. Bales are usually sampled only once from each side at the gin before export. One-half of the sample is sent to the national classing office and the other is given to the owner.

Gins are owned privately or jointly by producers in partnerships or cooperatives. Most gins begin to operate part time in late November and operate around the clock when the volume of harvest increases—usually for 4 to 5 months. Ginning usually is nearly completed by late April when the rains begin, but seed cotton kept in storage houses may be ginned after the rainy season starts and, in a few instances, may not be ginned until May.

At the height of the harvest season, seed cotton is hauled to gins much faster than it can be ginned. It is commonly stored in huge wire bins with no roofs. Infrequent showers do minor damage to such cotton.

In 1968-69, an average gin in Nicaragua handled about 11,900 bales, but in 1969-70, the average was only 9,100 bales per gin, owing to the smaller crop. This reduced gin volume adds another problem to Nicaragua's cotton economy. As in Guatemala, ginners feel that, at present ginning charges, a volume of about 10,000 bales is required to cover costs and to insure an attractive return on the investment.

## Marketing

An estimated one-third or more of Nicaragua's cotton is sold by farmers before ginning. This may be because of the keen competition among buyers or because some growers like to obtain their money from the cotton as early



as possible to pay production expenses. However, the practice seems to be declining as an increasing number of growers apparently feel that they get a better price when they sell their cotton as lint.

Prior to 1968-69, unginced cotton was generally sold at an average price, which tended to discourage efforts to sell a high-quality product. But in 1968-69, the National Cotton Commission established seed cotton standards based on trash content to encourage producers to harvest more carefully.

Producers sell much of their total crop, before or after ginning, directly to exporters. Gins and grower associations buy sizeable quantities, and foreign importers and other buyers take the remainder. Both local and international exporting firms play a prominent part in the marketing process in Nicaragua. Over 90 percent of the crop is exported, and most of this is handled by exporters rather than being sold directly to foreign importers. The exporters buy directly from gins and cooperatives as well as from growers. (Ginners sell most of the cotton they buy from growers to exporters.) Exporters buy on f.o.b. terms, with delivery on either gin or warehouse receipt. Shipment from gin to f.o.b. shipside costs about \$1.50 per bale. There is no export tax on cotton in Nicaragua.

All cotton is graded by a government agency. In terms of U.S. grades, nearly one-third of the crop is approximately middling light spotted and one-fourth is strict low middling. Very little is above middling or below low middling. Sizeable quantities are grayish, especially as the season progresses. Cotton fiber averages 1-1/16 inches long. Nicaraguan fiber tends to be 6,000-8,000 pounds per square inch weaker than other Central American cotton.

Cotton supply and distribution in Nicaragua,  
1950-51 through 1969-70

Year, beginning August 1	Stocks, August 1	Pro- duction	Total supply	Con- sumption <sup>1</sup>	Exports
	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>	<i>1,000 bales<sup>2</sup></i>
1950-51 . . . . .	9	22	31	4	24
1951-52 . . . . .	3	47	50	3	16
1952-53 . . . . .	29	57	86	3	69
1953-54 . . . . .	10	109	119	5	102
1954-55 . . . . .	8	205	213	5	100
1955-56 . . . . .	106	160	266	3	239
1956-57 . . . . .	23	193	216	4	150
1957-58 . . . . .	60	219	279	4	146
1958-59 . . . . .	125	218	343	5	331
1959-60 . . . . .	2	128	130	7	115
1960-61 . . . . .	8	146	154	7	139
1961-62 . . . . .	8	255	263	7	242
1962-63 . . . . .	12	340	352	7	288
1963-64 . . . . .	54	410	464	9	402
1964-65 . . . . .	52	565	617	10	571
1965-66 . . . . .	36	505	541	10	524
1966-67 . . . . .	7	525	532	14	427
1967-68 . . . . .	91	445	536	15	429
1968-69 . . . . .	92	405	497	32	452
1969-70 <sup>3</sup> . . . . .	13	295	308	22	271

<sup>1</sup>Includes cotton destroyed. <sup>2</sup>Bales of 480 lb. net. <sup>3</sup>Partly estimated.

Source: Official and trade statistics, reports of U.S. agricultural attachés, and other information.

A number of cotton cooperatives (producer organizations) sell members' cotton to exporters. In addition, some cooperatives operate gins; import planting seed, fertilizer, and insecticides; and arrange for aerial spraying. Although some such organizations have been financially successful, several have failed in the past few years.

Transportation facilities have been improved considerably in recent years, although development of secondary roads has lagged. Nicaragua's section of Pan American Highway and the roads from Managua to Leon and Chinandega are hard surfaced and in relatively good condition. The road from Chinandega to the port of Corinto is excellent, linking this deepwater port, from which much of the nation's cotton is exported, with the principal cotton-growing districts. Storage, loading, and dock facilities have been substantially improved in Corinto. Some cotton continues to move out from San Juan del Sur, where loading is by lighter. Railroad transportation is available from Managua to Corinto, but trucks are now the principal means of hauling seed cotton to gins and bales to market. Truck transportation reportedly can be obtained at relatively low rates.

Nicaragua's cotton is exported chiefly to Japan and Western Europe. Recently, almost two-thirds of total shipments have gone to Japan, and most other shipments to the Far East have gone to Taiwan and Hong Kong. West Germany, Italy, the United Kingdom, and Portugal account for nearly all exports to Europe.

Nicaragua's cotton exports by country of destination,  
average 1950-54 and 1960-64, annual 1965-68

Country of destination	Year beginning August 1					
	Average 1950-54	Average 1960-64	1965	1966	1967	1968
	<i>1,000 bales<sup>1</sup></i>	<i>1,000 bales<sup>1</sup></i>	<i>1,000 bales<sup>1</sup></i>	<i>1,000 bales<sup>1</sup></i>	<i>1,000 bales<sup>1</sup></i>	<i>1,000 bales<sup>1</sup></i>
Belgium & Luxembourg . . . . .	5	7	2	2	2	0
France . . . . .	1	16	7	3	3	3
Germany, West . . . . .	19	55	44	37	33	50
Hong Kong . . . . .	0	5	23	6	11	14
Italy . . . . .	2	9	23	11	13	30
Japan . . . . .	14	163	310	312	279	277
Netherlands . . . . .	9	17	2	2	2	1
Portugal . . . . .	0	14	62	21	15	13
Taiwan . . . . .	0	5	17	10	23	25
Thailand . . . . .	0	3	8	4	2	2
United Kingdom . . . . .	6	23	21	12	20	17
United States . . . . .	2	8	0	( <sup>2</sup> )	0	0
Other countries . . . . .	4	3	5	7	26	20
Total . . . . .	62	328	524	427	429	452

<sup>1</sup>Bales of 480 lb. net. <sup>2</sup>Less than 500 bales.

Source: *Recaudador General de Aduanas*, U.S. agricultural attachés, and other representatives abroad.

## Domestic consumption

Domestic use has increased steadily in recent years in Nicaragua's four mills. A fifth mill, with a capacity of about 10,000 bales a year, opened in 1970. In 1968-69, about 18,000 bales of cotton were utilized on 30,000 spindles and 1,068 looms. Yarn production was estimated at 10 million pounds, fabric output at 25 million yards. Most output is relatively low-count, but mills are gradually improving equipment. All mills now have dyeing and finishing sections. Consumption in 1969-70 is expected to rise to about 22,000 bales. Reportedly, small shipments of textiles will be made to other Central American countries. Nicaragua imports relatively small quantities of cotton and manmade fabrics (including blends) to supplement domestic output of cotton goods. No manmade fiber is produced locally.

## Outlook

Another rapid increase in cotton acreage seems highly doubtful, even in the unlikely event of sharply higher prices. In the next 4 or 5 years, Nicaraguan cotton area is likely to stabilize near 250,000 acres. Yields should improve from the present level of less than 600 pounds per acre, and production could return to around 350,000 bales. These increases will depend in large part on efforts to concentrate production in the hands of efficient farmers who can maintain higher yields and make a profit at present prices.

Cotton growers are more cautious now, remembering the uneconomic land-rush type of operations of several years ago. The risks are better understood, and some growers are not eager to go into seemingly less productive uses with possible higher costs. The government is acutely aware of cotton's role in the domestic economy and of the current problems, as shown by the decision in March 1970 to provide financing only to producers with known capacity to make a profit.

Economic factors will have a strong bearing on the future of cotton production. Should prices drop substantially for an extended period, many cotton growers may find their costs excessively high in relation to returns and turn to more attractive enterprises. Production practices in the years ahead may well have to be changed to match the availability of labor, especially for the harvesting operation and at the middle-management level, where the need for skilled persons is already evident.

Acreage may decline in the Managua area. However, interest in cotton growing is spreading to other potential producing areas such as Granada. Some additional lands in the Chinandega and Leon areas can be put into cotton. In the next few years, new roads will make this area more accessible. Around the town of Somotillo, Department of Chinandega, some land planted in sesame, now a popular crop, will probably go into cotton. However, because of more rainfall and heavier soils than in many of the other cotton areas of Chinandega, part of the Somotillo area is perhaps better suited to cattle or other enterprises than to cotton. The expanded irrigation program contemplated for Rivas could well influence future cotton production, whether the irrigated land is put into cotton or into food or other crops, which would release nonirrigated lands to cotton.

In the past few years, serious insect infestations and unfavorable weather have sharply lowered yields. In humid tropical zones insects are an unpredictable threat that probably will continue to influence yields, and, in turn, total production. Also, bollrot in many years destroys most of the crop on the lower one-third of the plant. Yet, yields may rise in years to come with use of better adapted varieties and improvements in fertilizing, spacing, weed control, and other cultural practices.

## OTHER CENTRAL AMERICAN COUNTRIES

### Production

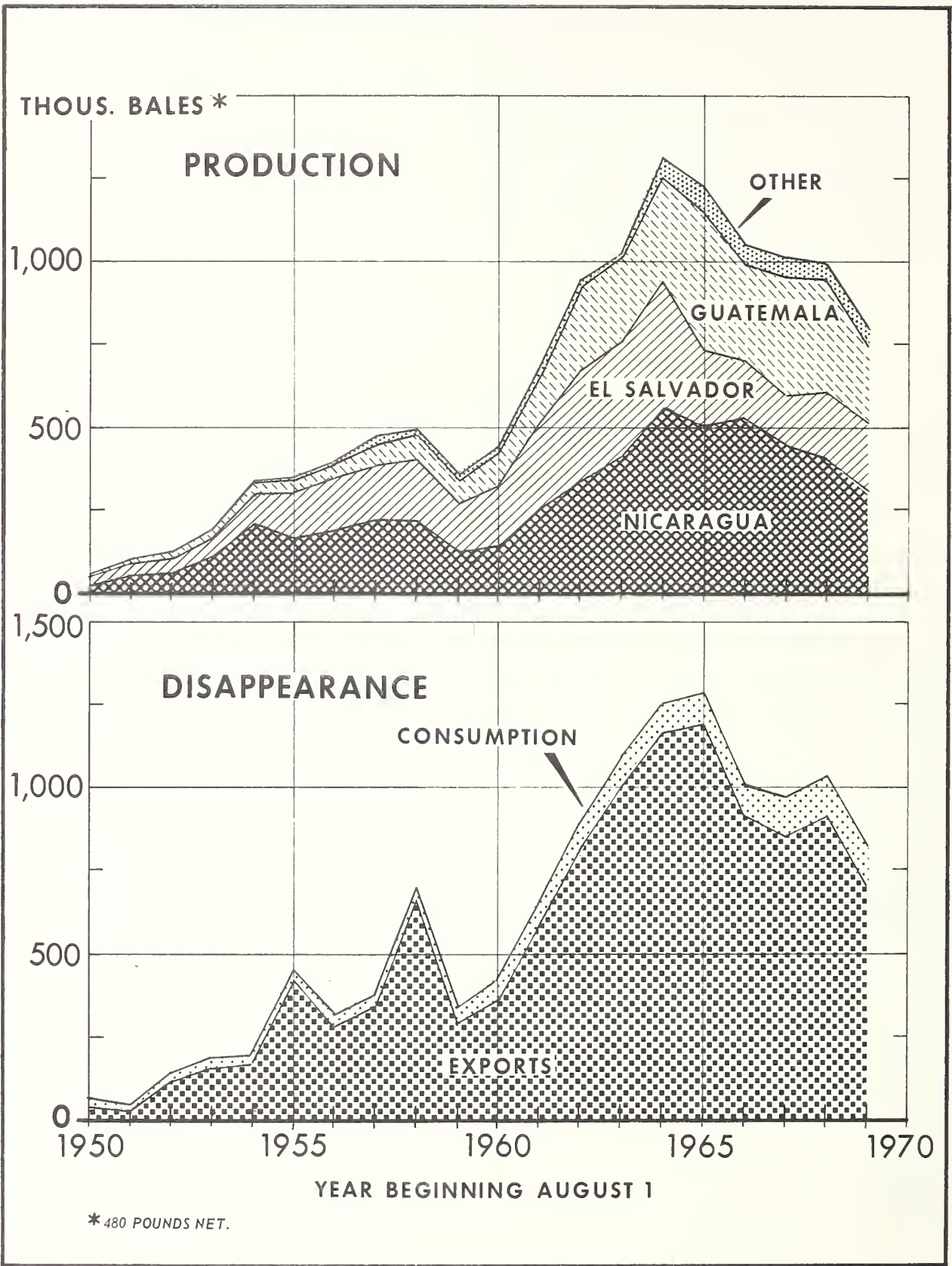
Cotton is produced in relatively limited quantities in other Central American countries, trailing behind coffee, bananas, and a number of other commodities. Rugged topography renders much land unsuitable for cultivation and the hot lowlands on the Caribbean are better suited to tropical crops than to cotton. Nevertheless, cotton has gained a foothold and is an important source of income to producers.

Honduras and Costa Rica each grew about 20,000 bales in 1969-70. For Costa Rica the crop was of normal size—yields average about 500 pounds per acre. But in Honduras with cotton acreage down to 16,000 acres in 1969-70 from 38,000 acres in the peak year of 1965-66, average yields have declined moderately to about 600 pounds per acre. Production costs there are high. The 1969 disturbances with El Salvador also hurt Honduras' crop because much cotton acreage was operated by Salvadoran nationals. Reportedly, Panama produced 1,000 bales or so of cotton in 1969-70 for use in the country's single mill. No major expansion of acreage there is expected.

Production practices in the minor cotton-producing countries in Central America are similar to those in the big three. Machinery is used whenever practical during early cultivation. Hand labor is used for late cultivation and harvest. Insecticide is applied 15 to 30 times per season, along with considerable fertilizer. Production credit in Honduras is obtained from the National Development Bank and from private sources, and in Costa Rica from local banks.

### Outlook

Over the next few years cotton acreage in the minor producing countries is expected to hold near present levels or possibly to decline. The governments have no national plans to push for expansion. Furthermore, rising production costs and relatively low world prices offer no encouragement for larger acreage. Honduras consumes about 8,000 bales annually; Costa Rica about 6,000. No more than a normal increase is expected over the next few years. Exports of cotton move primarily to Japan.



\* 480 POUNDS NET.



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